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Description

CONNECTOR

BACKGROUND OF INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a connector, and more specifically, to a connector for connecting a first board to a second board.

[0003] 2. Description of the Prior Art

[0004] In order to connect devices and interfaces, various kinds of connectors are widely used in electronic products such as notebooks, motherboards and interface cards etc. Most of the connectors transmit electrical signals through mutual contact of metal lines. Please refer to Fig.1. Fig.1 is a 3-dimensional diagram of a metal line connector 10 according to the prior art. The metal line connector 10 includes a male connector 12 installed on an interface card 14 and a female connector 16 installed on a circuit board 18, wherein the male connector 12 and the female connector 16 are detachable by inserting the male connector

12 into the female connector 16. Please refer to Fig.2. Fig.2 is a side-view diagram of the metal line connector 10 while separated. The transmission of electrical signals between the interface card 14 and the circuit board 18 depends on mutual contact of metal lines 20 on the male connector 12 and metal lines 22 on the female connector 16. Please refer to Fig.3. Fig.3 is a side-view diagram of the metal line connector 10 while connected. The male connector 12 and the female connector 16 of the metal line connector 10 are connected by pressing both connectors 12, 16 to insert the male connector 12 into the female connector 16, so that the metal lines 20 and the metal lines 22 can contact each other completely to ensure the signal transmission. Please refer to Fig.4. Fig.4 is a top-view diagram of the female connector 16 connected to the circuit board 18. Electrical signals output by the interface card 14 are transmitted from the metal lines 20 of the male connector 12 to the metal lines 22 of the female connector 16, then transmitted to the circuit board 18 through goldfingers 24 on the circuit board 18 connected to the metal lines 22.

[0005] However, the metal line connector 10 according to the prior art depends on connection of rigid bodies, therefore

due to the height of the connector itself, the two boards to be connected cannot be adhered to each other. To keep pace with the trend requiring electronic products to be compact, the required space of the connector must be reduced. Secondly, the interval distance between the metal lines is limited in manufacturing process. Considering the technology and the cost, the interval distance can be reduced to approximately 0.6mm. The required space of the connector can be reduced through a further reduction of the interval distance of the metal lines. Thirdly, metal line connectors are widely used devices produced in enormous quantities. It is beneficial to the industry if other cost-saving materials are used.

SUMMARY OF INVENTION

[0006] It is therefore a primary objective of the present invention to provide a connector to solve the problems of the prior art mentioned above.

[0007] Briefly summarized, a connector according to the present invention is used to connect a first board to a second board, which includes at least one conductive media comprising a plurality of insulating layers and a plurality of conductive layers, in which each layer is formed between two insulating layers. The connector further includes a

frame comprising a hollow space for holding the conductive media.

[0008] These and other objectives of the present invention will no doubt become obvious to those of ordinary skill in the art after reading the following detailed description of the preferred embodiment that is illustrated in the various figures and drawings.

Brief Description of Drawings

[0009] Fig.1 is a 3-dimensional diagram of a metal line connector according to the prior art.

[0010] Fig.2 is a side-view diagram of the metal line connector of Fig.1 while separated.

[0011] Fig.3 is a side-view diagram of the metal line connector of Fig.1 while connected.

[0012] Fig.4 is a top-view diagram of the female connector of Fig.1 connected to the circuit board.

[0013] Fig.5 is a side-view diagram of a first connector while separated according to the first embodiment of the present invention.

[0014] Fig.6 is a diagram of the conductive medium shown in Fig.5.

[0015] Fig.7 is a top-view diagram of the first lower frame shown in Fig.5 connected to the circuit board.

[0016] Fig.8 is a top-view diagram of the conductive media shown in Fig.5 held in place by the hollow spaces.

[0017] Fig.9 is a side-view diagram of the first connector shown in Fig.5 while connected.

[0018] Fig.10 is a side-view diagram of a second connector while separated according to the second embodiment of the present invention.

[0019] Fig.11 is a side-view diagram of a third connector while separated according to the third embodiment of the present invention.

[0020] Fig.12 is a top-view diagram of the second lower frame shown in Fig.11 connected to the circuit board.

[0021] Fig.13 is a top-view diagram of the conductive medium shown in Fig.11 held in place by the hollow spaces.

[0022] Fig.14 is a side-view diagram of the third connector shown in Fig.11 while connected.

DETAILED DESCRIPTION

[0023] Please refer to Fig.5. Fig.5 is a side-view diagram of a first connector 26 while separated according to the first embodiment of the present invention. The first connector 26 includes a first upper frame 28 installed on an interface card 14 and a first lower frame 30 installed on a circuit board 18 which could be a printed circuit board (PCB). The

first upper frame 28 includes two upper hooks 32, and the first lower frame 30 includes two lower hooks 34 so that the first upper frame 28 and the first lower frame 30 are detachable by hooking the upper hooks 32 and the lower hooks 34 together. The first upper frame 28 and the first lower frame 30 are plastic frames, and the first connector 26 further comprises two rectangular cubic shaped rows of conductive media 36 running parallel to each other. (Because Fig.5 is a side-view, only one row of conductive media 36 is visible in Fig.5.) Please refer to Fig.6. Fig.6 is a diagram of the conductive media 36. The conductive media 36 includes a plurality of conductive layers 38 which can be composed of conductive ceramic particles, metal particles or conductive metal lines, and a plurality of insulating layers 40 which can be composed of insulating rubber or insulating ceramic materials. The conductive layers 38 and the insulating layers 40 are arranged alternately so that the conductive layers 38 do not contact with each other in order to be insulated.

[0024] Please refer to Fig.7. Fig.7 is a top-view diagram of the first lower frame 30 connected to the circuit board 18. The first lower frame 30 includes two hollow spaces 42 for holding the two rows of conductive media 36. The

lower sides of the conductive layers 38 on the conductive media 36 are electrically connected directly to the goldfingers 24 on the circuit board 18. Please refer to Fig.8. Fig.8 is a top-view diagram of the conductive media 36 held in place by the hollow spaces 42. Each one of the conductive layers 38 is connected to a metal line of the goldfingers 24 in order to transmit electrical signals between the conductive layers 38 and the circuit board 18. The structure of the first upper frame 28 is the same to that of the first lower frame 30, which includes two hollow spaces 42. The connection of the first upper frame 28 and the interface card 14 is the same to that shown in Fig.7. The upper sides of the conductive layers 38 on the conductive media 36 are electrically connected directly to the goldfingers 24 on the interface card 14, each one of the conductive layers 38 is connected to a metal line of the goldfingers 24 in order to transmit electrical signals between the conductive layers 38 and the interface card 14. A similardescriptive diagram is hereby omitted.

[0025] The conductive media 36 are fixed to the hollow spaces of the first upper frame 28 and the first lower frame 30. Please refer to Fig.9. Fig.9 is a side-view diagram of the first connector 26 in connection. The first upper frame 28

and the first lower frame 30 are connected to each other by pressingboth frames 28,30 to hook the upper hooks 32 and the lower hooks 34, so that the upper sides of the conductive layers 38 are electrically connected to the goldfingers on the interface card 14, and the lower sides of the conductive layers 38 are electrically connected to the goldfingers on the circuit board 18. In this way the electrical signals between the interface card 14 and the circuit board 18 can be transmitted through the conductive layers 38.

[0026] Please refer to Fig.10. Fig.10 is a side-view diagram of a second connector 44 while separated according to the second embodiment of the present invention. The second connector 44 includes a frame 45 installed on a circuit board 18. The circuit board 18 can be a PCB. The frame 45 includes two top plugs 48, and an interface card 14 includes two apertures 46 so that the interface card 14 is fixed to the frame 45 by inserting the top plugs 48 on the frame 45 to the apertures 46. The frame 45 is a plastic frame, and the second connector 44 further comprises two rectangular cubic shaped rows of conductive media 36 running parallel to each other. The conductive media 26 according to the second embodiment are of the same

structure as the conductive media 26 in Fig.6, and the electrical connection between the interface card 14 and the circuit board 18 is the same as that in the first embodiment, therefore further descriptions are hereby omitted.

[0027] Please refer to Fig.11. Fig.11 is a side-view diagram of a third connector 50 while separated according to the third embodiment of the present invention. The third connector 50 includes a second upper frame 52 installed on an interface card 14 and a second lower frame 54 installed on a circuit board 18. The circuit board 18 can be a PCB. The second upper frame 52 includes two upper hooks 32, and the second lower frame 54 includes two lower hooks 34 so that the second upper frame 52 and the second lower frame 54 are detachable by hooking the upper hooks 32 and the lower hooks 34 together. The difference when compared to the previously mentioned embodiments is that the third connector 50 has only one row of conductive media 36.

[0028] Please refer to Fig.12. Fig.12 is a top-view diagram of the second lower frame 54 connected to the circuit board 18. The differencewith the previously mentioned embodiments is that, the second lower frame 54 only has one

hollow space 42 for holding the conductive media 36. The lower sides of the conductive layers 38 on the conductive media 36 are electrically connected directly to the goldfingers 24 on the circuit board 18. Please refer to Fig.13. Fig.13 is a top-view diagram of the conductive media 36 held in place by the hollow space 42. Each one of the conductive layers 38 is connected to each metal line of the goldfingers 24 in order to transmit electrical signals between the conductive layers 38 and the circuit board 18. The structure of the second upper frame 52 is the same to that of the second lower frame 54, which includes one hollow space 42. The connection of the second upper frame 52 and the interface card 14 is the same as shown in Fig.12. The upper sides of the conductive layers 38 on the conductive media 36 are electrically connected directly to the goldfingers 24 on the interface card 14 and each one of the conductive layers 38 is connected to a metal line of the goldfingers 24 in order to transmit electrical signals between the conductive layers 38 and the interface card 14. A descriptive diagram is hereby omitted.

[0029] The conductive media 36 is fixed to the hollows space of the second upper frame 52 and the second lower frame 54. Please refer to Fig.14. Fig.14 is a side-view diagram of

the first connector 26 while connected. The connection and the transmission of electrical signals are the same as that in the first embodiment and further descriptions are therefore omitted.

[0030] In contrast to the prior art, highly flexible materials such as rubber can be used as insulating materials in conductive media to form the connector according to the present invention. In this way the interval distance between circuit boards can be reduced so that the connector can be more widely applied in electronic products with limited available space. Secondly, the thickness of the conductive layers and the insulating layers is much less than the interval distance between metal lines according to the prior art.In the present invention this distance can be reduced to approximately 0.05mm so that the space required by the connector is reduced. Thirdly, the cost of the connector according to the present invention is reduced to less than 50 percent of the cost of the prior art, therefore it is very suitable for mass production.

[0031] Those skilled in the art will readily observe that numerous modifications and alterations of the device may be made while retaining the teachings of the invention. Accordingly, the above disclosure should be construed as limited

only by the metes and bounds of the appended claims.